

# Microfabrication of microfluidic molds for layer-specific microchannel networks

TRR Tyler R Ray

Updated date: Apr 27, 2021

 An abbreviated version of this protocol was published in Science Translational Medicine in Mar 2021

Soft, skin-interfaced sweat stickers for cystic fibrosis diagnosis and management

DOI: 10.1126/scitranslmed.abd8109

## Detailed protocol

### Fabrication of a Microfluidic Mold

1. Spin coat KMPPR 1010 onto a clean, dry silicon wafer at 3000 RPM for 30 s (10  $\mu$ m film). The silicon wafer should be sufficiently thick to support etching (1.5 mm thickness, 100 mm diameter is used in this work).
2. Soft bake at 110C for 5 min and cool to ambient temperature at 15C/min
3. Expose etch pattern using lithographic patterning tool. A Heidelberg MLA 150 is used in this work at an exposure setting of 420 mJ cm<sup>2</sup>.
4. Develop in AZ 300 MIF for 7 min.
5. Etch via deep-reactive ion etching (DIRE) process to desired depth. A Plasma-Therm Versaline DSE system was utilized for this work at an etch rate of 1.5  $\mu$ m / min. An integrated 5 min oxygen plasma clean at the end of the etch process removes any residual photoresist.
6. Spin coat a thin film mold release layer. Polymethyl methacrylate (495 PMMA C6, MicroChem Corp) is the film used in this work. The layer is formed via spin coating at 4000 RPM for 30 s followed by a 5 min hard bake at 100C.

At this point, the fabrication process is complete.

Additional examples of this process are described in the following papers

<https://doi.org/10.1039/C7LC00525C>

<https://doi.org/10.1002/sml.201703334>

<https://doi.org/10.1126/sciadv.aav3294>

**How to cite:** (Readers should cite both the Bio-protocol preprint and the original research article where this protocol was used)

1. Ray, T. R.(2021). Microfabrication of microfluidic molds for layer-specific microchannel networks. Bio-protocol Preprint. [bio-protocol.org/prep1045](https://bio-protocol.org/prep1045).
2. Ray, T. R., Ivanovic, M., Curtis, P. M., Franklin, D., Guventurk, K., Jeang, W. J., Chafetz, J., Gaertner, H., Young, G., Rebollo, S., Model, J. B., Lee, S. P., Ciraldo, J., Reeder, J. T., Hourlier-Fargette, A., Bandodkar, A. J., Choi, J., Aranyosi, A. J., Ghaffari, R., McColley, S. A., Haymond, S. and Rogers, J. A.(2021). Soft, skin-interfaced sweat stickers for cystic fibrosis diagnosis and management. Science Translational Medicine 13(587). DOI: [10.1126/scitranslmed.abd8109](https://doi.org/10.1126/scitranslmed.abd8109)

**Copyright:** Content may be subjected to copyright.